What is claimed is:

1. A method for generating new tissue, the method comprising:

obtaining a liquid hydrogel-cell composition comprising a hydrogel and tissue precursor cells;

delivering the liquid hydrogel-cell composition into a permeable, biocompatible support structure; and

allowing the liquid hydrogel-cell composition to solidify within the support structure and the tissue precursor cells to grow and generate new tissue.

2. The method of claim 1, wherein the delivered liquid hydrogel-cell composition is injected into the support structure.

3. The method of claim 1, further comprising implanting the support structure into an animal.

4. The method of claim 3, wherein the hydrogel-cell composition is delivered after the support structure is implanted into an animal.

5. The method of claim 1, wherein the support structure comprises a ceramic material.

6. The method of claim 1, wherein the support structure is shaped in the form of desired tissue.

7. The method of claim 6, wherein the support structure is shaped in the form of articular cartilage adjacent a joint, a bone, a portion of a bone, or a bone defect.

8. The method of claim 6, wherein the support structure is shaped in the form of a cylinder having the diameter of the spinal cord of a mammal to be treated.

9. The method of claim 1, wherein the support structure is biodegradable.

10. The method of claim 1, wherein the support structure comprises a sponge or foam.

11. The method of claim 1, wherein the support structure is compressible.

12. The method of claim 1, wherein the support structure comprises a mesh of fibers.

13. The method of claim 1, wherein the support structure is rigid.

14. The method of claim 1, wherein the support structure is formed from polyanhydride, polyorthoester, polyglycolic acid, polylactic acid, or polyglactin.

15. The method of claim 1, wherein the support structure comprises porous hydroxyapatite.

16. The method of claim 1, wherein the hydrogel is selected from the group consisting of polysaccharides, proteins, polyphosphazenes, poly(oxyethylene)-poly(oxypropylene) block polymers, poly(oxyethylene)-poly(oxypropylene) block polymers of ethylene diamine, poly(acrylic acids), poly(methacrylic acids), copolymers of acrylic acid and methacrylic acid, poly(vinyl acetate), and sulfonated polymers.

17. The method of claim 1, wherein the tissue precursor cells are selected from the group consisting of epidermal cells, chondrocytes and other cells that form cartilage, macrophages, dermal cells, muscle cells, hair follicles, fibroblasts, organ cells, osteoblasts and other cells that form bone, endothelial cells, mucosal cells, pleural cells, ear canal cells, tympanic membrane cells, peritoneal cells, Schwann cells, corneal epithelial cells, gingiva cells, neural cells, neural stem cells, and tracheal epithelial cells.

18. The method of claim 1, wherein the tissue precursor cells are selected from the group consisting of central nervous system neural stem cells, autonomic nervous system neural stem cells, or peripheral nervous system neural stem cells.

19. The method of claim 1, wherein the tissue precursor cells are selected from the group consisting of brain stem cells and spinal cord stem cells.

20. The method of claim 1, wherein the tissue precursor cells are neuroendocrine stem cells.

21. The method of claim 1, wherein the tissue precursor cells are selected from the group consisting of bladder, small intestine, lung, heart, kidney, and liver autonomic neural stem cells.

22. A tissue forming structure comprising:

a permeable, biocompatible support structure having a predetermined shape that corresponds to the shape of desired tissue; and

a hydrogel-cell composition at least partially filling the support structure, wherein the hydrogel-cell composition comprises a hydrogel and tissue precursor cells.

23. The tissue forming structure of claim 22, wherein the hydrogel-cell composition is a solidified suspension of hydrogel supporting dispersed tissue precursor cells.

24. The tissue forming structure of claim 22, wherein the support structure comprises a ceramic material.

25. The tissue forming structure of claim 22, wherein the support structure is biodegradable.

26. The tissue forming structure of claim 22, wherein the support structure comprises a sponge or foam.

27. The tissue forming structure of claim 22, wherein the support structure is compressible.

28. The tissue forming structure of claim 22, wherein the support structure comprises a mesh of polymeric fibers.

29. The tissue forming structure of claim 22, wherein the support structure comprises a mesh of polyglycolic acid fibers and polylactic acid.

30. The tissue forming structure of claim 22, wherein the support structure is formed from polyanhydride, polyorthoester, polyglycolic acid, polylactic acid, or polyglactin.

31. The tissue forming structure of claim 22, wherein the support structure comprises porous hydroxyapatite.

32. The tissue forming structure of claim 22, wherein the support structure comprises metal.

33. The tissue forming structure of claim 22, wherein the support structure is rigid.

34. The tissue forming structure of claim 22, wherein the hydrogel is selected from the group consisting of polysaccharides, proteins, polyphosphazenes, poly(oxyethylene)-poly(oxypropylene) block polymers, poly(oxyethylene)-poly(oxypropylene) block polymers of ethylene diamine, poly(acrylic acids), poly(methacrylic acids), copolymers of acrylic acid and methacrylic acid, poly(vinyl acetate), and sulfonated polymers.

35. The tissue forming structure of claim 22, wherein the tissue precursor cells are selected from the group consisting of epidermal cells, chondrocytes and other cells that form cartilage, macrophages, dermal cells, muscle cells, hair follicles, fibroblasts, organ cells, osteoblasts and other cells that form bone, endothelial cells, mucosal cells, pleural cells, ear canal cells, tympanic membrane cells, peritoneal cells, Schwann cells, corneal epithelial cells, gingiva cells, neural cells, neural stem cells, and tracheal epithelial cells.

36. The tissue forming structure of claim 22, wherein the tissue precursor cells are selected from the group consisting of central nervous system neural stem cells, autonomic nervous system neural stem cells, or peripheral nervous system neural stem cells.

37. The tissue forming structure of claim 22, wherein the tissue precursor cells are selected from the group consisting of brain stem cells and spinal cord stem cells.

38. The tissue forming structure of claim 22, wherein the tissue precursor cells are neuroendocrine stem cells.

39. The tissue forming structure of claim 22, wherein the tissue precursor cells are selected from the group consisting of bladder, small intestine, lung, heart, kidney, and liver autonomic neural stem cells.

40. A tissue forming structure of claim 22, wherein the cells are bone forming cells and the support structure comprises porous hydroxyapatite.

41. An isolated, mammalian adult autonomic nervous system neural stem cell.

42. The isolated stem cell of claim 41, wherein the cell is isolated from heart, bladder, intestine, lung, liver, or kidney tissue.

43. An isolated, mammalian adult neuroendocrine stem cell.

44. A stem cell of claim 43, wherein the cell is isolated from adrenal gland or pancreas tissue.

45. A method of treating defective nervous tissue, the method comprising

locating the physical boundaries of the defective tissue;

removing the defective tissue to create a cavity and exposing healthy nervous tissue at the surfaces of the cavity;

loading a hydrogel-neural stem cell composition into a support structure in the general size and shape of the cavity, wherein the neural stem cells are selected to differentiate into the healthy nervous tissue; and

implanting the support structure into the cavity, thereby treating the defective nervous tissue.

46. The method of claim 45, wherein the defective nervous tissue is central nervous system tissue.

47. The method of claim 45, wherein the defective nervous tissue is in the brain.

48. The method of claim 45, wherein the defective nervous tissue is autonomic nervous system tissue.

49. The method of claim 45, wherein the defective nervous tissue is neuroendocrine tissue.

50. The method of claim 45, wherein the neural stem cells are isolated from the healthy nervous tissue.

51. The method of claim 45, wherein a spacer is implanted into the cavity temporarily, and is then replaced with the support structure.

52. The method of claim 45, wherein the hydrogel-neural stem cell composition is loaded into the support structure after the structure is implanted into the cavity.

53. A method of claim 45, wherein the defective nervous tissue is in the spinal cord, the method comprising

locating the physical boundaries of the defective spinal cord tissue;

removing the defective tissue to create a cavity and exposing healthy spinal cord tissue at the surfaces of the cavity;

loading a hydrogel-spinal cord stem cell composition into a support structure in the general size and shape of the spinal cord cavity; and

implanting the support structure into the spinal cord cavity, thereby treating the defective spinal cord tissue.